IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

   M. MITSUMORI et al

Serial No. 09/810,191   Group Art Unit: 2122

Filed: March 19, 2001   Examiner: J. RUTTEN

For: COMPILE METHOD FOR STORING SOURCE CODE WITHIN OBJECT CODE

REQUEST FOR NEW OFFICE ACTION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

    Applicants received an Office Action dated October 6, 2004.

Enclosed with the Office Action was a copy of "The Stabs Debug Format",

Menapace et al (1993), Free Software Foundation, Inc. The document is

not mentioned in the Office Action. Further, the document is not

listed on the PTO-892 form. Accordingly, Applicants request

clarification in the Office Action as to whether the document has been

cited of record or not. A new Office Action setting forth a new date

of mailing is requested in accordance with M.P.E.P. 710.06.

Respectfully submitted,

John R. Mattingly
Registration No. 30,293
Attorney for Applicant(s)

MATTINGLY, STANGER & MALUR
1800 Diagonal Rd., Suite 370
Alexandria, Virginia 22314
(703) 684-1120
Date: November 4, 2004

The "stabs" debug format

Julia Menapace, Jim Kingdon, David MacKenzie
Cygnus Support

1 Overview of Stabs

Stabs refers to a format for information that describes a program to a debugger. This format was apparently invented by Peter Kessler at the University of California at Berkeley, for the pdx Pascal debugger; the format has spread widely since then.

This document is one of the few published sources of documentation on stabs. It is believed to be comprehensive for stabs used by C. The lists of symbol descriptors (see Appendix B [Symbol Descriptors], page 51) and type descriptors (see Appendix C [Type Descriptors], page 53) are believed to be completely comprehensive. Stabs for COBOL-specific features and for variant records (used by Pascal and Modula-2) are poorly documented here.

Other sources of information on stabs are *Dbx and Dbxtool Interfaces*, 2nd edition, by Sun, 1988, and *AIX Version 3.2 Files Reference*, Fourth Edition, September 1992, "dbx Stabstring Grammar" in the a.out section, page 2-31. This document is believed to incorporate the information from those two sources except where it explicitly directs you to them for more information.

1.1 Overview of Debugging Information Flow

The GNU C compiler compiles C source in a '.c' file into assembly language in a '.s' file, which the assembler translates into a '.o' file, which the linker combines with other '.o' files and libraries to produce an executable file.

With the '-g' option, GCC puts in the '.s' file additional debugging information, which is slightly transformed by the assembler and linker, and carried through into the final executable. This debugging information describes features of the source file like line numbers, the types and scopes of variables, and function names, parameters, and scopes.

For some object file formats, the debugging information is encapsulated in assembler directives known collectively as *stab* (symbol table) directives, which are interspersed with the generated code. Stabs are the native format for debugging information in the a.out and XCOFF object file formats. The GNU tools can also emit stabs in the COFF and ECOFF object file formats.

The assembler adds the information from stabs to the symbol information it places by default in the symbol table and the string table of the '.o' file it is building. The linker consolidates the '.o' files into one executable file, with one symbol table and one string table. Debuggers use the symbol and string tables in the executable as a source of debugging information about the program.

1.2 Overview of Stab Format

There are three overall formats for stab assembler directives, differentiated by the first word of the stab. The name of the directive describes which combination of four possible data fields follows. It is either .stabs (string), .stabn (number), or .stabd (dot). IBM's XCOFF assembler uses .stabx (and some other directives such as .file and .bi) instead of .stabs, .stabn or .stabd.

The overall format of each class of stab is: